

THE TAXONOMIC HISTORY, IDENTITY, AND DISTRIBUTION OF THE NEVADA ENDEMIC, *PLAGIOBOTHRYNS GLOMERATUS* (BORAGINACEAE)

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ABSTRACT

*Plagiobothrys glomeratus* A. Gray is a western Nevada endemic restricted to areas of altered andesite. It is morphologically close to *P. hispidus* A. Gray. *Plagiobothrys hispidus* is more widespread and shows much variation as to number and size of nutlets. Reports of *P. glomeratus* from California are based on misidentifications of *P. hispidus*. Illustrations of the nutlets and a distribution map of both species are included.

Current floristic studies in the Pine Nut Mountains of western Nevada uncovered a problem in defining *Plagiobothrys glomeratus* A. Gray. This study was undertaken to clarify the identity and distribution of *P. glomeratus*.

Gray (1885) described *Plagiobothrys glomeratus* from two collections by Katharine Curran (later Brandegee) taken between Virginia City and Carson City, Nevada. In the same article Gray described *P. hispidus* A. Gray based on a collection, again taken by Curran, from the streets of Truckee in nearby California. These two sites are approximately 27 air miles apart. Both taxa are members of section *Plagiobothrys* characterized by alternate leaves, lateral nutlet scars placed near or above the center of the nutlets, and not growing in seasonally saturated soils. They share the characteristic of having rather broad upper cauline leaves with *P. jonesii* A. Gray and *P. kingii* (S. Watson) A. Gray. Both *P. kingii* and *P. jonesii* have elongated nutlet scars along the ventral keel and an earlier spring flowering time in contrast with nutlet scars about as wide as long, placed at the end of the ventral keel, and a later spring to summer flowering time in *P. hispidus* and *P. glomeratus*. As such *P. hispidus* and *P. glomeratus* are more similar to each other than to any other species.

The first treatment of *P. glomeratus* is that of Greene (1887) who described the genus *Sonnea* to accommodate *P. glomeratus*, *hispidus*, *jonesii*, and *kingii*. He later described *Sonnea foliacea* from the geographic area between the type localities of *P. glomeratus* and *P. hispidus* (Greene 1888).

Johnston (1923) published a synopsis of *Plagiobothrys* placing *glomeratus* and *hispidus* in his *Sonnea* group and *kingii* and *jonesii* in his *Amsinckopsis* group. He also reduced Greene's *Sonnea foliacea* to a variety of *P. hispidus* and stated: "It is possible that the plant is a hybrid between *P. hispidus* and *P. glomeratus*."

Tidestrom (1925) in his Flora of Utah and Nevada recognized the distinctiveness of *P. hispidus* and *P. glomeratus* but followed Greene in placing

them in the genus *Sonnea*. He also maintained *S. foliacea* as a good species.

Cronquist (1984) recognized *P. glomeratus* as an acceptable species with the comment "Reno south nearly to Carson City, rarely collected." The only other published references for the distribution of *P. glomeratus* in Nevada are from the south side of Peavine Mountain where it is reported as occurring in an open pine stand (Billings 1992; Williams et al. 1992).

*Plagiobothrys glomeratus* is not included or mentioned in any flora covering California (Abrams 1951; Jepson 1925, 1943; Messick 1993; Munz 1968; Munz, and Keck 1959). Since none of the above references mention *P. glomeratus* or place it in synonymy I assume they did not have any evidence to believe it occurred in California.

DeDecker (1990) reported *P. glomeratus* as new to California. Her records are Sweetwater Mountains, above Star City, *DeDecker 5677* (RSA!) and Sierra Nevada, "The Bluffs," 0.6 miles NNE of Mammoth Rock, *Bagley 3001* (personal herbarium of Mark Bagley, Bishop, California!). A check with Roxanne Bittman of the California Natural Diversity Data Base, in Sacramento, CA, revealed no other known specimens from California. The DeDecker and Bagley records are the basis for including *P. glomeratus* in the California Native Plant Society inventory of rare and endangered vascular plants of California (Skinner and Pavlik 1994). I find both of these specimens to be *P. hispidus*. The misidentifications likely come from the lack of understanding of *P. hispidus* not from the true nature of *P. glomeratus*. Few California references provide the nutlet size for *P. hispidus*. Munz and Keck (1959) and Abrams (1951) list the size as 1 mm while Messick (1993) lists the size as 1–1.5 mm. Cronquist (1959, 1984) twice has dealt with *P. hispidus* and his descriptions are essentially the same. The one slight difference is nutlet length, 1–2 mm in 1959 and 1–2 (2.5) in 1984.

I have found that the nutlets of *Plagiobothrys hispidus* vary in the number that mature. At the north end of its range many plants have four ma-

turing nutlets while at the south end one or two is the norm. The number of maturing nutlets greatly influences their orientation, shape, and size. If four nutlets mature they are vertically oriented, less than 2 mm long, have a definite dorsal keel, and are unevenly tuberculate or rugose-tuberculate (see Fig. 1, illustration A). This is the nutlet type illustrated in Cronquist (1959, 1984) and represented by the type collection of *P. hispidus*. When one or two nutlets mature they are horizontally oriented, up to 2.4 mm long, flat-backed with a more obscure keel, the end farthest from the scar is greatly expanded, and the roughness is more evenly appressed and not as evident. It is this nutlet type that is represented by *DeDecker 5677* and *Bagley 3001*, the basis of the reports of *P. glomeratus* from California, and by the type of *Sonnea foliacea* (see Fig. 1, illustration C). On the other hand *P. glomeratus* is extremely uniform with larger, mottled, shiny nutlets, and is edaphically restricted (see Fig. 1, illustration D).

I can see how one could be misled in trying to identify the California specimens. The nutlet size does not fit the descriptions in Munz and Keck (1959) or Messick (1993). In checking Intermountain Flora (Cronquist 1984) the illustration of *P. hispidus* is that of the smaller four nutlet type. The broad fat-ended illustration of *P. glomeratus* then becomes the logical choice.

I agree with Cronquist (1984) in placing *Sonnea foliacea* in synonymy with *P. hispidus*. The extremes seem distinctive but all stages of intermediacy occur. For instance, many collections from the Truckee, CA area contain plants with nutlets of both the *hispidus* and *foliacea* type.

Gray (1885) in describing *P. glomeratus* describes its distributions as: "Western part of Nevada, between Carson and Virginia City, 1883 and 1884, Mrs. Layne-Curran." There are two sheets in the Gray Herbarium that fit Gray's protologue. One is labeled "Geiger Grade, Aug. 1883, Curran s.n." and the other "between Carson and Virginia, [undated], Curran s.n." Selection of the "Carson to Virginia" sheet as a lectotype was effectively done by Cronquist (1984).

The results of this study indicate that *Plagiobothrys glomeratus* is a western Nevada endemic restricted to areas of altered andesite between 4860 and 6650 ft in elevation. These altered andesite areas have shallow azonal soils nearly totally lacking in nutrients and with an acidic pH (3.7-4.0) (Billings 1992). Soils are so nutrient poor that they are not able to support the ubiquitous sagebrush, *Artemisia tridentata* Nutt., or other shrubs in any number (Billings 1950, 1992). This lack of competition from shrubs has allowed relic stands of Sierran conifers to persist in isolated pockets. The altered andesite areas are orangish light-brown in surface color and are dotted with dark green conifers. As such they are a conspicuous feature on the hills around Reno (Billings 1950, 1992). Although concentrated in the Reno area there are outliers of altered andesite as far northeast as the Pah Rah Range, east to Ramsey in the Virginia Range, and south to the Sweetwater and White Mountains of California and *P. glomeratus* may eventually be found at some of these sites (Billings 1992).

*Plagiobothrys glomeratus* is known from the Virginia Range in Storey and Washoe Counties, Carson Range of the Sierra Nevada, foothills north of Reno, and from nearby Peavine Mountain, all in Washoe County (see Fig. 2). Its distribution nearly matches that of the only other known altered andesite endemic, *Eriogonum robustum* E. L. Greene (type also collected by Curran in 1884). Both occur less than six miles from California and eventually may be found there. Searches in the Truckee River canyon west of Reno, and near Markleeville south-southwest of Gardnerville, have so far proved fruitless.

*Plagiobothrys hispidus* occurs from south-central Oregon south and east through the eastern Sierra Nevada of California and Nevada to the Mammoth area in Mono and adjacent Madera Counties (see Fig. 2). There are outliers on Steens Mountain, Harney County, Oregon, Skeedaddle Mountain, Lassen County, California, Granite Range, Washoe County, Nevada, Pine Nut Mountains, Douglas County, Nevada, and the Masonic Hills and Sweetwater Mountains in Mono County, California.

KEY TO *PLAGIOBOTHRYUS GLOMERATUS* AND *HISPIDUS*

- Nutlets smooth and shiny, mottled, 2.4-3.0 mm long, horizontally oriented, . . . . . *P. glomeratus*
- Nutlets unevenly tuberculate to paved with the roughness always readily discernable, up to 2.4 mm long, horizontally or vertically oriented. . . . . *P. hispidus*

Specimens of *Plagiobothrys glomeratus* examined, all from Nevada

STOREY CO., Virginia Range, Six Mile Canyon, 4.2 road miles E of highway 341, *Tiehm 12544* (BRY, CAS, NY, OSC, RENO, RSA, UC, UTC); Virginia Range, 1.1 road miles SE of N junction of highways 341 and 342 on highway 341, *Tiehm 12542* (ARIZ, BRY, CAS, GH, MONT, NY, OSC,

RENO, RM, RSA, UC, UNLV, UT, UTC, WS); WASHOE CO., Dandini Blvd. N of Reno, *Nachlinger 1375* (NY), *Tiehm & Kelley 12522* (CAS, NY, OSC, RENO, UC, UTC); west slopes of Peavine Mountain., *Nachlinger & Billings 1374* (NY); hill east of Black Panther Mine, 3 miles N of Reno, *Billings 1296* (RENO); Geiger Grade, Jul 1884, *Curran s.n.* (DS); Geiger Grade to Virginia City, *Eastwood 14809* (CAS); Geiger Grade, Aug 1883,

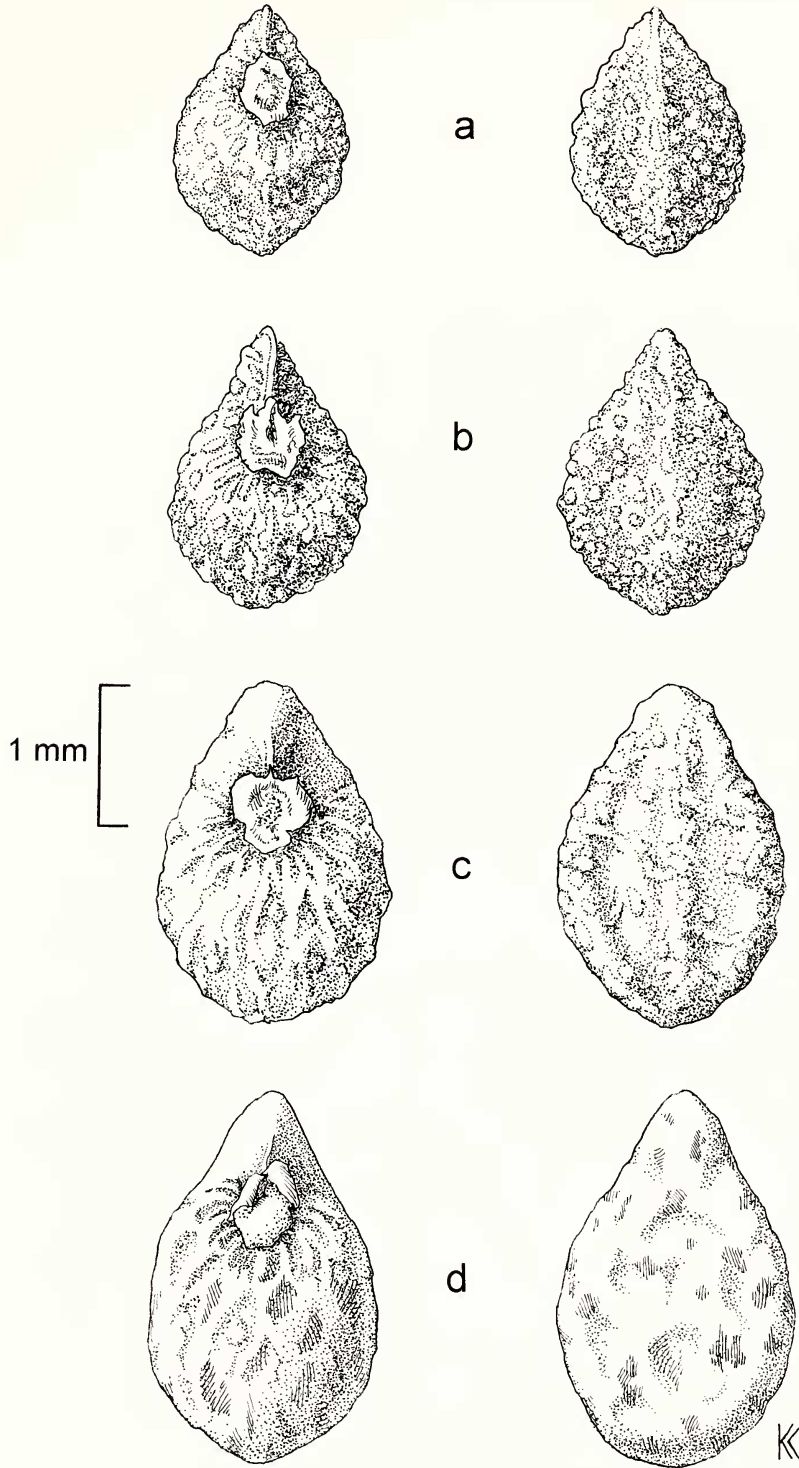


FIG. 1. A-C are nutlets of *Plagiobothrys hispidus*, D is nutlets of *Plagiobothrys glomeratus*. A is drawn from Steward 6798, Deschutes Co., OR (NY); B from Sonne s.n., Truckee, Nevada Co., CA (NY); C from Tiehm 12244, Pine Nut Mountains, Douglas Co., NV (RENO); and D from Eastwood 14809, Geiger Grade to Virginia City, Storey Co., NV (CAS).

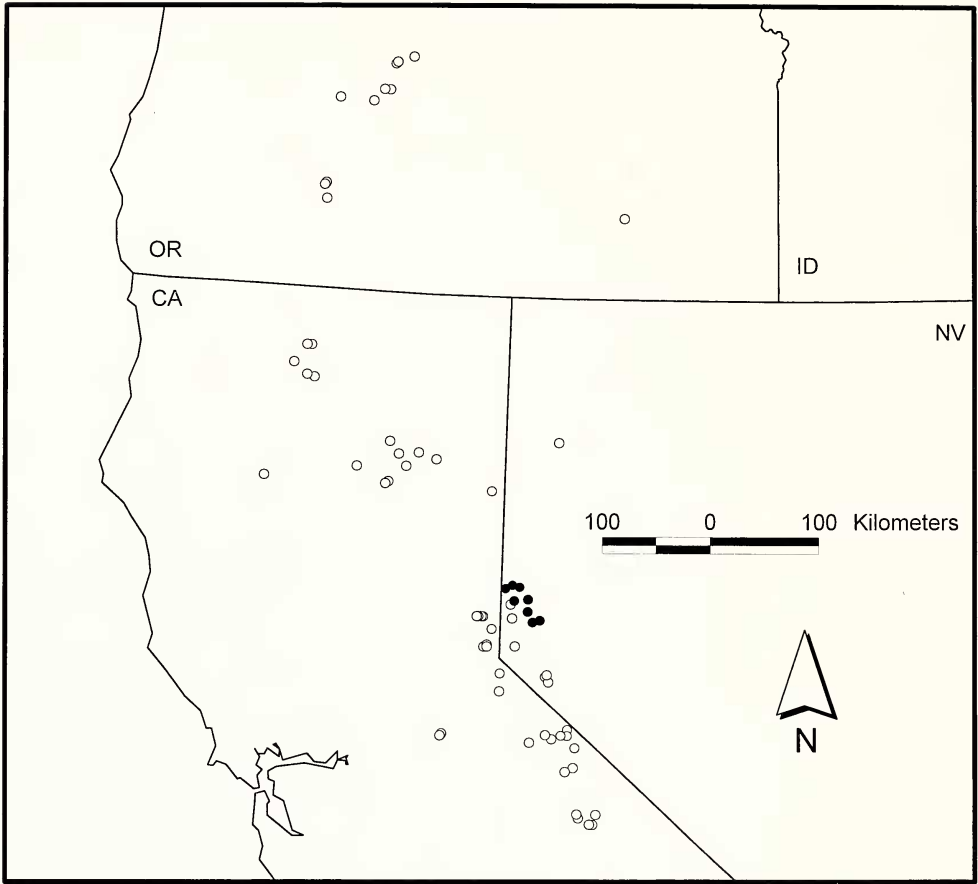


FIG. 2. Map showing parts of Oregon, Idaho, Nevada, and California. The distribution of *Plagiobothrys glomeratus* is designated by solid circles and the distribution of *P. hispidus* is designated by open circles.

*Curran s.n.* (GH); Virginia Range, Geiger Grade, 2.8 road miles E of highway 395 on highway 341, *Tiehm 12540* (ARIZ, ASU, B, BRY, CAS, COLO, CS, DAO, GH, ID, K, KSC, LE, MICH, MO, MONT, MONTU, NY, OKL, OS, OSC, RENO, RM, RSA, SI, TEX, UC, UNLV, UTC, WIS, WS, WTU); Virginia Range, foothills E of the S end of Hidden Valley County Park, *Tiehm 12547* (CAS, NY, OSC, RENO, RM, RSA, UC, UTC, WTU); Sierra Nevada, Carson Range, ridge on N side of N fork of Evans Creek, *Tiehm 12548* (BRY, CAS, MICH, MO, MONT, NY, OSC, RENO, RM, RSA, UC, UNLV, UTC); Sierra Nevada, Carson Range, ridge divide between Hunter and Alum Creeks, *Tiehm 12593* (CAS, NY, OSC, RENO, UC): COUNTY UNKNOWN, Nevada between Carson & Virginia, [undated], *Curran s.n.* (GH lectotype).

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